

What is claimed is:

1. A substrate polishing apparatus characterized by comprising:
 - a polishing table against which a substrate is pressed;
 - 5 a light-emitting and light-receiving device to emit measurement light from said polishing table to said substrate and to receive reflected light from said substrate for measuring a film on said substrate;
 - a fluid supply passage for supplying a fluid for measurement to a fluid chamber provided at a light-emitting and light-receiving position of said polishing table, said measurement light and said reflected light passing through said fluid for measurement; and
 - 10 a fluid supply control device for controlling supply of said fluid for measurement to said fluid chamber.
- 15 2. The substrate polishing apparatus as recited in claim 1, characterized in that said fluid supply control device controls supply of said fluid for measurement to said fluid chamber according to a positional relationship between said fluid chamber and said substrate.
- 20 3. The substrate polishing apparatus as recited in claim 1, characterized in that said fluid supply control device ejects said fluid for measurement to said fluid chamber during a blocking period during which said fluid chamber is blocked by said substrate.
- 25 4. The substrate polishing apparatus as recited in claim 3, characterized in that during an unblocking period during which said fluid chamber is not blocked by said substrate, said fluid supply control device supplies said fluid for measurement to said fluid chamber at a flow rate lower than a flow rate during ejection.

5. The substrate polishing apparatus as recited in claim 1, characterized by comprising a compulsory discharge control device for controlling compulsory discharge of a fluid in said fluid chamber according to the positional relationship between said fluid chamber and said substrate.

5

6. The substrate polishing apparatus as recited in claim 5, characterized in that said compulsory discharge control device compulsorily discharges the fluid in said fluid chamber during a blocking period during which said fluid chamber is blocked by said substrate.

10

7. The substrate polishing apparatus as recited in claim 6, characterized in that said compulsory discharge control device continues compulsory discharge of the fluid in said fluid chamber during a predetermined post-blocking period after said blocking period is completed.

15

8. The substrate polishing apparatus as recited in claim 5, characterized in that said compulsory discharge control device restricts compulsory discharge of the fluid in said fluid chamber during a predetermined pre-blocking period before said fluid chamber is blocked by said substrate.

20

9. A substrate polishing apparatus characterized by comprising:
a polishing table against which a substrate is pressed;
a light-emitting and light-receiving device to emit light from said polishing table to said substrate and to receive reflected light from said substrate;

25

a first passage for ejection, said first passage introducing a fluid, through which said light and said reflected light pass, to a fluid chamber provided at a light-emitting and light-receiving position of said polishing table;

a second passage for a low flow rate, said second passage being restricted as compared to said first passage for ejection which introduces said fluid to said fluid

chamber; and

a switching device for switching said first and second passages into which said fluid is introduced.

5 10. A substrate polishing apparatus characterized by comprising:

a polishing table having a polishing surface against which a substrate is pressed; and

a passage to supply a fluid to said polishing surface on said polishing table, wherein said passage includes a passage for a high flow rate and a passage

10 for a low flow rate.

11. A substrate polishing apparatus characterized by comprising:

a polishing table having a polishing surface for polishing a semiconductor substrate;

15 a light-emitting optical fiber which emits measurement light for measuring a film of said semiconductor substrate through an opening provided in said polishing surface to said semiconductor substrate; and

a light-receiving optical fiber which receives said measurement light reflected from said semiconductor substrate,

20 wherein an emitting end of said light-emitting optical fiber and an incident end of said light-receiving optical fiber are located adjacent to each other, and a distance from said light-emitting optical fiber and said light-receiving optical fiber to said semiconductor substrate is determined based on an angle of divergence of said light-emitting optical fiber and an angle of divergence of said light-receiving optical 25 fiber.

12. The substrate polishing apparatus as recited in claim 11, characterized in that said distance from said light-emitting optical fiber and said light-receiving optical fiber to said semiconductor substrate is determined based on a value L

calculated by

$$L = (1 - N^2)^{1/2} \times (2T + C) / 2N$$

where N is a NA value of said light-emitting optical fiber and said light-receiving optical fiber, C is a core diameter, and T is a thickness of a clad.

5

13. The substrate polishing apparatus as recited in claim 11, characterized by comprising light-emitting and light-receiving condensation means for condensing measurement light emitted by said light-emitting optical fiber to said semiconductor substrate, and condensing measurement light reflected from said semiconductor substrate to said light-receiving optical fiber, said light-emitting and light-receiving condensation means being provided so as to cover said emitting end of said light-emitting optical fiber and said incident end of said light-receiving optical fiber.

14. The substrate polishing apparatus as recited in claim 11, characterized in that one of said light-emitting optical fiber and said light-receiving optical fiber is surrounded by the other of said light-emitting optical fiber and said light-receiving optical fiber.

15. A substrate polishing apparatus characterized by comprising:
20 a polishing table having a polishing surface for polishing a semiconductor substrate;

a light-emitting optical fiber which emits measurement light for measuring a film of said semiconductor substrate through an opening provided in said polishing surface to said semiconductor substrate; and

25 a light-receiving optical fiber which receives said measurement light reflected from said semiconductor substrate,

wherein an optical axis of said light-emitting optical fiber and an optical axis of said light-receiving optical fiber are inclined with respect to each other.

16. The substrate polishing apparatus as recited in claim 15, characterized in that said optical axis of said light-emitting optical fiber and said optical axis of said light-receiving optical fiber are symmetric with respect to a normal line of said semiconductor substrate.

5

17. A substrate polishing apparatus characterized by comprising:
a polishing table having a polishing surface for polishing a semiconductor substrate; and
an optical fiber member for emitting measurement light for measuring a film
10 of said semiconductor substrate through an opening provided in said polishing surface to said semiconductor substrate and for receiving said measurement light reflected from said semiconductor substrate,

wherein said optical fiber member includes at least one light-emitting optical fiber and at least one light-receiving optical fiber, and one of said at least one
15 light-emitting optical fiber and said at least one light-receiving optical fiber is surrounded by the other of said at least one light-emitting optical fiber and said at least one light-receiving optical fiber.

18. The substrate polishing apparatus as recited in claim 17, characterized in
20 that one of said at least one light-emitting optical fiber and said at least one light-receiving optical fiber covers the other of said at least one light-emitting optical fiber and said at least one light-receiving optical fiber.

19. A substrate polishing apparatus characterized by comprising:
25 a polishing table having a polishing surface for polishing a semiconductor substrate; and
an optical fiber member for emitting measurement light for measuring a film
of said semiconductor substrate through an opening provided in said polishing surface to said semiconductor substrate and for receiving said measurement light

reflected from said semiconductor substrate,

wherein said optical fiber member includes a plurality of light-emitting optical fibers and a plurality of light-receiving optical fibers, and said light-emitting optical fibers and said light-receiving optical fibers are bundled together.

5

20. A substrate polishing apparatus characterized by comprising:
a polishing table having a polishing surface for polishing a semiconductor substrate; and
an optical fiber member for emitting measurement light for measuring a film
10 of said semiconductor substrate through an opening provided in said polishing surface to said semiconductor substrate and for receiving said measurement light reflected from said semiconductor substrate,
wherein said optical fiber member comprises a composite optical fiber having divided cross-sections including a region of a light-emitting optical fiber and
15 a region of a light-receiving optical fiber.